

Remarks

The present application had claims 1-6, 8 and 11-21 pending. Applicants have herein amended claims 1 and 8 and have cancelled claim 3. Accordingly, claims 1, 2, 4-6, 8 and 11-21 are currently pending.

Support for the amendment to claim 1 may be found throughout the application, including in the previously pending claim 3 and in the specification on page 7, lines 3-31. The amendment to claim 8 was made to improve the grammar of the claim language and is minor in nature. No new matter has been introduced by the amendments.

In the October 30th Office Action, the Examiner rejected all the pending claims under 35 USC §103 as obvious over Starz, et al. (USP 6,514,296) in view of Yano (USP 5,380,806) and Tsai, et al. (USP 6,514,296).

Applicants respectfully disagree with the Examiner's position. However, in order to advance prosecution of the present application, Applicants have amended claim 1 (the only independent claim) to restrict the claimed invention to water-based catalyst inks comprising an electrocatalyst, an ionomer, water and a surfactant with a vapor pressure between 1 and 600 Pascal (the limitation of previously pending claim 3) in a particular weight percent range, 0.1 to 20 wt. %.

The presently claimed invention is discussed on page 7, lines 3-13, of the specification:

In a second embodiment, the present invention uses improved water-based catalyst inks to coat substrates. These water-based catalyst ink compositions comprise an electrocatalyst, an ionomer resin, water (as a main solvent) and a surfactant with a vapor pressure in the range of 1 to 600 Pascal (Pa) at room temperature (20-25°C). The surfactants improve the wetting and leveling characteristics of the ink, particularly to hydrophobic substrate materials, such as polymer films or PTFE-impregnated backings. The high vapor pressure facilitates the removal of the surfactants after the leveling process when exposed to slightly elevated temperatures in the drying stage. As a consequence, less surfactant remains in the printed electrode layers; this in turn leads to an improvement in electrical performance of the electrode layers, and consequently, of the MEAs manufactured with these inks.

The specific range of vapor pressure is necessary to obtain complete removal of the surfactant during the drying step. As a result, the practice of the presently claimed invention leaves less surfactant in the electrode layers. Accordingly, the catalytic centers in the layers are less blocked – providing better electrical performance (see page 7, line 11-13). Conventional surfactants are high boiling, with low vapor pressure - in general, below 1 Pascal - and are adsorbed to the catalytic centers of the electrocatalyst, thereby blocking the access of the reactants to the catalyst surface.

With respect to the cited references, the Starz, et al. reference does not disclose or suggest an ink comprising a surfactant either in the weight percentage range specified in amended claim 1 or having the required vapor pressure of claim 1. Although glycerol is present in the inks of Starz, et al., the glycerol is acting as an organic solvent, not a surfactant. Even if the glycerol is considered a surfactant, it is not present in the amount required by amended claim 1 (0.1 to 20 wt. %) nor does glycerol have the required vapor pressure of 1 to 600 Pascal, as required by amended claim 1.

The teachings of Yano and Tsai, et al. do not remedy the shortcomings of Starz, et al. Yano is not even applicable to the present invention, and thus, cannot be properly

combined with Starz, et al. As detailed in the last response, Yano discloses a screen printing ink for covering of flexible printed circuit boards, which comprises a polyurethane and an epoxy component. The ink of Yano does not contain any water and is very sensitive to humidity – thus, it has to be prepared under nitrogen atmosphere. There is no motivation for one of ordinary skill practicing the teachings of Starz, et al. to look to Yano. Absence a teaching or suggestion in Starz, et al. or in Yano, these references cannot be combined to form a basis of an obviousness rejection.

Even if the combination was proper (which it is not), Yano does not teach catalyst inks having surfactants with vapor pressures in the range set forth in amended claim 1 or present in the amounts required by amended claim 1.

Likewise, the Tsai, et al. reference is not applicable to the present invention. The teachings of Tsai, et al. are directed to the manufacture of double-layer bipolar capacitors. Tsai, et al. disclose a printing process for a two-component epoxy material having a useful lifetime of about 30 minutes. The Tsai, et al. reference does not disclose catalyst inks. Accordingly, there is no incentive for one skilled in the art to look to this reference or combine it with Starz, et al. and/or Yano.

Even if Tsai, et al. is combined with Starz, et al. and Yano (which it should not be), there still is no teaching regarding the use of a surfactant having a vapor pressure in the range set forth in amended claim 1, or being present in the amounts specified in amended claim 1.

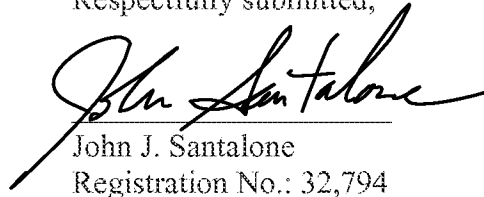
In view of the foregoing the remarks, reconsideration of the rejection under 35 USC §103 and allowance of the application are respectfully requested.

No fee is deemed due for this amendment, other than the fee for the requested one month extension of time. If any additional fees are due, or an overpayment has been made, please charge, or credit, our Deposit Account No. 11-0171 for such sum.

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If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the telephone number provided below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John J. Santalone", written over a horizontal line.

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